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Sequential Sampling Procedures

for the Cotton Fleahopper

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JOHN E. HUTCHISON, DIRECTOR, COLLEGE STATION, TEXAS

Sequential Sampling Procedures for the Cotton Fleahopper *Pseudatomoscelis seriatus (Reuter)*

Winfield Sterling and Ed Pieters
Texas Agricultural Experiment Station
Department of Entomology
Texas A&M University

SEQUENTIAL SAMPLING is a sampling technique which enables the cotton scout to *rapidly* determine the need for control of a given pest with predetermined accuracy. Sampling procedures discussed in the Texas cotton insect control publications use a constant sample size of 100 plants. In using a sequential sampling plan, the number of plants sampled is variable, but is usually 25 or fewer. There is a "lower limit" and an "upper limit" of a running total of infested plants. A running total less than the "lower limit" indicates the absence of damaging fleahopper numbers and treatment is not indicated. A running total greater than the "upper limit" indicates damaging fleahopper numbers and treatment needed.

Size of the sample area within a field should be limited to 20 acres. While walking an X pattern through the field, the cotton scout should randomly select and examine individual plant terminals (top 6 inches of plant) for fleahoppers. Good success has been achieved by taking a single plant sample every 25 paces that is representative of the plant population. Randomness is essential in choosing the plant. The scout then visually examines the plant terminal to determine if it is infested. When at least one adult or nymph fleahopper is observed, examination ceases on that plant. The scout records the result for each plant on the sequential sampling table, as either infested (one or more fleahoppers) or not infested (no fleahoppers), and then moves to the next sample.

If the *running total* of infested plants is greater than the "lower limit" and less than the "upper limit," no decision can be made and sampling should continue. If the running total of infested plants is less than the "lower limit" or greater than the "upper limit," sampling can be terminated. However, for each of the different population levels (50, 35 and 25 percent), it would be wise to take a minimum of 10, 18 and 21 samples, respectively, before making a decision. To decide which design to use, the 50 percent table is suggested when crop earliness is a less desirable objective than yields exceeding 1½ bales per acre. This situation usually exists under cultural practices which include heavy fertilization, irrigation and a long growing season. When crop earliness is desired and prospects for yields do not exceed 1½ bales per acre, the 25 or 35 percent designs may be used. During the first 3 weeks of squaring, sampling should be done at least twice a week.

Treatment decisions seldom should be based on insect counts alone. No treatments should be made for fleahoppers if plants are fruiting readily. If 25 to 50 percent of the small squares (less than ¼-inch long) are not being set on the eighth node, and if sequential sampling for fleahoppers indicates a need, treatments should be initiated.

HOW TO USE SEQUENTIAL SAMPLING

1. Limit this technique to 20 acres at one time.
2. Walk an X pattern or large circle through the cotton field.
3. Select one cotton plant at random every 25 paces.
4. Examine the terminal (top 6 inches) for fleahopper adults or nymphs.
5. If the plant is infested (one or more nymphs or adults) mark a "1" in the running total column by plant number one. If uninfested mark a "0."
6. Select a second plant at 25 paces, inspect the terminal and if infested add a "1" and record the running total in the running total column by plant "2."
7. Continue to select plants every 25 paces, sample for fleahoppers and keep a running total.
8. Compare each running total to the "upper and lower limits" as each sample is taken.
9. If the running total is *greater than* the "upper limit," begin treatments. Care should be exercised in treating with insecticides after the first bloom because of the danger of triggering a bollworm-budworm outbreak.
10. If the running total is *less than* the "lower limit," the decision not to treat can be made. Sample again in 3 to 4 days.
11. If the running total is not greater than the "upper limit" or less than the "lower limit," continue sampling until it moves into either area.

*Research support and technique provided by Dr. W. L. Sterling, Dept. of Entomology, Texas A&M University.

EXAMPLE

Plant No.	Lower limit	Running total	Upper limit
1	N.D.	1	4
2	N.D.	+ 1 = 2	4
3	N.D.	+ 1 = 3	5
4	N.D.	+ 1 = 4	5
5	N.D.	+ 1 = 5	6
6	N.D.	+ 1 = 6	6
7	N.D.	+ 1 = 7	7
8	N.D.	+ 1 = 8	7
9	N.D.	+ 1 = 9	7
10		+ 1 = 10	8

Ten is greater than 8, so treatment is indicated.

If one fleahopper nymph were found on each of 10 plants sampled consecutively, a treatment decision would be made on the tenth plant. (Note: although the running total exceeded the upper limit by the eighth sample, it is wise to take a minimum of 10 plants before making a decision).

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Table 1. Sequential sampling for the cotton fleahopper where 50 percent infested plant terminals is considered treatment level.

Plant No.	Lower limit	Running total	Upper limit	Plant No.	Lower limit	Running total	Upper limit
1	N.D.*		4	51	18		25
2	N.D.*		4	52	18		26
3	N.D.*		5	53	19		26
4	N.D.*		5	54	19		26
5	N.D.*		6	55	20		27
6	N.D.*		6	56	20		27
7	N.D.*		7	57	21		28
8	N.D.*		7	58	21		28
9	N.D.*		7	59	21		29
10	1		8	60	22		29
11	1		8	61	22		29
12	2		9	62	23		30
13	2		9	63	23		30
14	2		9	64	24		31
15	3		10	65	24		31
16	3		10	66	24		32
17	4		11	67	25		32
18	4		11	68	25		32
19	5		12	69	26		33
20	5		12	70	26		33
21	5		12	71	27		34
22	6		13	72	27		34
23	6		13	73	28		34
24	7		14	74	28		35
25	7		14	75	28		35
26	7		15	76	29		36
27	8		15	77	29		36
28	8		15	78	30		37
29	9		16	79	30		37
30	9		16	80	30		37
31	10		17	81	31		38
32	10		17	82	31		38
33	10		18	83	32		39
34	11		18	84	32		39
35	11		18	85	32		40
36	12		19	86	33		40
37	12		19	87	33		40
38	13		20	88	34		41
39	13		20	89	34		41
40	13		21	90	35		42
41	14		21	91	35		42
42	14		21	92	35		43
43	15		22	93	36		43
44	15		22	94	36		43
45	16		23	95	37		44
46	16		23	96	37		44
47	16		23	97	38		45
48	17		24	98	38		45
49	17		24	99	38		46
50	18		25	100	39		46

NO TREATMENT NEEDED

TREATMENT INDICATED IF SQUARE LOSS IS EXCESSIVE

(Continued)

*N.D. = No decision until running total is obtained from a minimum of 10 plants.

Table 2. Sequential sampling for the cotton fleahopper where 35 percent infested plant terminals is considered treatment level.

Plant No.	Lower limit	Running total	Upper limit	Plant No.	Lower limit	Running total	Upper limit
1	N.D.*		5	51	11		20
2	N.D.*		5	52	11		20
3	N.D.*		5	53	11		20
4	N.D.*		6	54	12		21
5	N.D.*		6	55	12		21
6	N.D.*		6	56	12		21
7	N.D.*		7	57	12		22
8	N.D.*		7	58	13		22
9	N.D.*		7	59	13		22
10	N.D.*		8	60	13		22
11	N.D.*		8	61	14		23
12	N.D.*		8	62	14		23
13	N.D.*		8	63	14		23
14	N.D.*		9	64	15		24
15	N.D.*		9	65	15		24
16	N.D.*		9	66	15		24
17	N.D.*		10	67	15		25
18	1		10	68	16		25
19	1		10	69	16		25
20	1		11	70	16		25
21	2		11	71	17		26
22	2		11	72	17		26
23	2		11	73	17		26
24	3		12	74	17		27
25	3		12	75	18		27
26	3		12	76	18		27
27	3		13	77	18		28
28	4		13	78	19		28
29	4		13	79	19		28
30	4		14	80	19		28
31	5		14	81	20		29
32	5		14	82	20		29
33	5		14	83	20		29
34	6		15	84	20		30
35	6		15	85	21		30
36	6		15	86	21		30
37	6		16	87	21		31
38	7		16	88	22		31
39	7		16	89	22		31
40	7		17	90	22		31
41	8		17	91	23		32
42	8		17	92	23		32
43	8		17	93	23		32
44	9		18	94	23		33
45	9		18	95	24		33
46	9		18	96	24		33
47	9		19	97	24		34
48	10		19	98	25		34
49	10		19	99	25		34
50	10		20	100	25		34

NO TREATMENT NEEDED

TREATMENT INDICATED IF SQUARE LOSS IS EXCESSIVE

(Continued)

*N.D. = No decision until running total is obtained from a minimum of 18 plants.

Table 3. Sequential sampling for the cotton fleahopper where 25 percent infested plant terminals is considered treatment level.

Plant No.	Lower limit	Running total	Upper limit	Plant No.	Lower limit	Running total	Upper limit
1	N.D.*		4	51	7		13
2	N.D.*		4	52	7		14
3	N.D.*		4	53	7		14
4	N.D.*		4	54	7		14
5	N.D.*		4	55	7		14
6	N.D.*		5	56	8		14
7	N.D.*		5	57	8		15
8	N.D.*		5	58	8		15
9	N.D.*		5	59	8		15
10	N.D.*		5	60	8		15
11	N.D.*		6	61	9		15
12	N.D.*		6	62	9		16
13	N.D.*		6	63	9		16
14	N.D.*		6	64	9		16
15	N.D.*		7	65	9		16
16	N.D.*		7	66	10		16
17	N.D.*		7	67	10		17
18	N.D.*		7	68	10		17
19	N.D.*		7	69	10		17
20	N.D.*		8	70	10		17
21	1		8	71	11		17
22	1		8	72	11		18
23	1		8	73	11		18
24	1		8	74	11		18
25	1		9	75	11		18
26	2		9	76	12		18
27	2		9	77	12		19
28	2		9	78	12		19
29	2		9	79	12		19
30	2		10	80	12		19
31	3		10	81	12		19
32	3		10	82	13		20
33	3		10	83	13		20
34	3		10	84	13		20
35	3		11	85	13		20
36	4		11	86	13		20
37	4		11	87	14		21
38	4		11	88	14		21
39	4		11	89	14		21
40	4		12	90	14		21
41	5		12	91	14		21
42	5		12	92	15		22
43	5		12	93	15		22
44	5		12	94	15		22
45	5		13	95	15		22
46	6		13	96	15		22
47	6		13	97	16		23
48	6		13	98	16		23
49	6		13	99	16		23
50	6		13	100	16		23

NO TREATMENT NEEDED

TREATMENT INDICATED IF SQUARE LOSS IS EXCESSIVE

(Continued)

*N.D. = No decision until running total is obtained from a minimum of 21 plants.